1. ~~J. J. Vogt~~ JJV
2. ~~B. C. Bailey~~ BCBJr
3. ~~G. B. Fortney~~ TBF

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ORGDP HEALTH PHYSICS PROGRAM FOR DECEMBER 1976

Compiled by
J. C. Bailey
ORGDP Health Physics

January 19, 1977

UNION CARBIDE

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

prepared for the **U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION**
under **U.S. GOVERNMENT** *Contract W-7405 eng 26*

ChemRisk Document No. 1889

HIGHLIGHTS

FLANGE CONTAMINATION IN THE CASCADE IMPROVEMENT PROGRAM (Page 4). Air samples taken to better define the significance of neptunium in cascade equipment showed that the measures routinely used to control uranium exposure are also adequate for the concurrent neptunium exposure potential.

TRAINING AND EDUCATION (Page 8). A total of 254 employees attended four different health physics training sessions presented by members of the Oak Ridge Gaseous Diffusion Plant Health Physics Section.

CONTENTS

ORGDP HEALTH PHYSICS PROGRAM FOR DECEMBER 1976

INTRODUCTION AND SUMMARY

This monthly report summarizes Health Physics (HP) activities at the Oak Ridge Gaseous Diffusion Plant (ORGDP). The HP goal is to ensure that exposures of persons to radioactive material or ionizing radiation are as low as is practicable, and below applicable radiation protection guide values. This is accomplished through evaluation of exposure levels and potentials, with appropriate recommendations to plant management.

Principal December activities included air sampling in Buildings K-31 and K-33, the investigation of the presence of neptunium-237 at these locations, health physics training for plant groups, and continuation of expanded survey activities.

PROGRAM ACTIVITIES

FLANGE CONTAMINATION IN THE CASCADE IMPROVEMENT PROGRAM

Air samples taken to better define the significance of neptunium in cascade equipment showed that the measures routinely used to control uranium exposure are also adequate for the concurrent neptunium exposure potential.

Four air samples taken during weld-preparation grinding operations on contaminated cascade equipment flanges indicated the presence of neptunium-237 in Buildings K-33 and K-31, in concentrations exceeding the U. S. Energy Research and Development Administration (ERDA) Radiation Protection Standard for soluble neptunium compounds. Employees doing this work routinely wear respirators; therefore, personnel exposures from this source are not anticipated. Additional data are being obtained to define all operations, plant locations, and equipment items which may present any exposure potential that might require control actions other than those routinely employed for uranium handling operations.

Table 1 summarizes data on breathing-zone air samples and personnel contamination measurements obtained during cell changeout activities in Buildings K-31 and K-33. These results reveal no situation in which normal uranium-handling techniques fail to provide adequate protection with respect to the presence of neptunium.

CONFERENCE ATTENDANCE

A member of the HP staff attended the ERDA Annual Health Protection Meeting at St. Petersburg Beach, Florida. Of special interest and applicability to ORGDP operations was the presentation of a paper by an ERDA representative on the federally-enacted *Privacy Act* which requires permission of individuals before radiation data regarding them can be revealed to other organizations, except as specified in the Act. The manner of communicating

Table 1

BREATHING-ZONE AIR SAMPLING DURING CELL CHANGEOUTS IN BUILDINGS K-31 AND K-33

Job Type	Total Number of Air Samples	Gross Alpha Activity,(a) c/m/ft^3 Maximum	Gross Alpha Activity,(a) c/m/ft^3 Average
1. Cutting out cell piping	7	10.1	2.25
2. Removing converters	5	0.32	0.11
3. Weld preparation	11	106.5	17.08
4. Weld scarfing	9	0.1	0.02
5. Root pass weld	22	0.43	0.1
6. Second weld	18	0.11	0.03
7. Inside cell area during equipment removal	5	0.32	0.11
8. Continuous air monitor outside cell	63	0.13	0.04

Personnel Contamination

Number Checked	Maximum Count, c/m/100 cm^2 Hands	Shoes	Clothing	Gloves
40	300	500	400	2,000

(a) The Plant Action Guide for uranium in air is 2 c/m/ft^3, as shown in SPP B-392, Appendix I.

personnel monitoring data to interested organizations may be involved; for example, the transmittal to a subcontractor of data obtained by ORGDP regarding that subcontractor's employees may require individual approval of each employee. The paper indicated that ERDA is pressing for interpretation of the law relative to such situations.

CONTINUING SURVEY AND SURVEILLANCE PROGRAMS

X-RAY GENERATOR EVALUATION

[Keywords: Radiation Protection]

The shopwork required before field modification can be done was completed on the three additional X-ray generators identified by asterisks in Table 2. Field modification of these generators can now proceed.

Table 2

STATUS OF X-RAY EQUIPMENT AND ISOTOPIC SOURCES

Unit	Property Number	Use	Responsible Department	% Completion in Shop	% of Bills of Material Completed
Westinghouse	253862	Medical	1090	0	66
Dick	232785*	Film Badge	1094	100	100
Phillips	244182	Diffraction	1323	12	0
Siemens	259819	Diffraction	1323	12	50
Norelco	250073*	Diffraction	1323	100	100
Picker	193615	Diffraction	1323	Stored - Not in Use	
Seifert	245328	Radiographic	1312	10	66
Phillips	268867	Radiographic	1312	4	60
Norelco	252510	Radiographic	1312	19	100
Phillips	270272	Radiographic	1312	10	66
Picker Andrex	None	Radiographic	1312	(a)	
Picker Andrex	None	Radiographic	1312	(a)	
Picker	255837*	Fluoroscopic	1312	100	100
Iridium-192 Source	--	Radiographic	1312	100	None
Cobalt-60 Source	--	Radiographic	1312	100	None
Cobalt-60 Source	--	Film Calibration	1317	17	100
Cobalt-60 Source	--	Emergency	1317	Stored - Not in Use	

(a) Modified earlier at the Y-12 Plant to meet engineering specifications.

AREA AND EQUIPMENT SURVEYS

Routine and special-request surveys are summarized in Table 3.

Table 3

CONTAMINATION SURVEYS

Work Areas	43
Lunchrooms	13
Pieces of decontaminated equipment	1317
Miscellaneous items	1854
Shipping cylinders and/or packages	206
Trailers and railcars handling uranium hexafluoride	82
Personnel checks	106
Air samples	22

URANALYSIS PROGRAM

As shown in Table 4, a large number of urine samples contained uranium concentrations above the plant action guide (PAG), the level at which the source of possible exposure is investigated. The incidents investigated included four Maintenance Mechanics, one Operator, and one contractor employee who were in the area of a uranium hexafluoride (UF_6) release when a valve in Building K-31 was being removed; two Maintenance Mechanics and one Operator in the area of a UF_6 release when a hole was drilled into a Monel boss in Building K-402-9; two Operators in a UF_6 release from a toll enrichment cylinder pigtail in Building K-1423; an Operator performing routine decontamination and trap changes in Building K-1420; an Operator (2 samples) in the area of a UF_6 release from a pigtail-purging operation in Building K-1131; an Operator sampling and handling UF_6 cylinders in Building K-1131; and two Maintenance Mechanics changing valves and seals in Building K-31. Follow-up samples showed that the excretion rates had decreased to levels well below the PAG, indicating no significant body retention of uranium.

Table 4

URINALYSIS SAMPLES

Samples submitted for analysis	583
Analyses reported	580
Samples exceeding the plant action guide for uranium and/or alpha activity	17

Studies are continuing relative to minimizing the use of respirators by welders during cell change work. Four welders from each of three shifts have participated in a sampling program by submitting a urine sample at the beginning and end of their work week for a period of 4 to 6 weeks. Following this, they were sent to the Y-12 Plant for whole body counting. They were counted for both uranium and neptunium. None of the urinalysis or body counts indicated significant exposures.

TRAINING AND EDUCATION

Radiation Technicians

One member of the ORGDP-HP staff completed a 100-hr Health Physics Technician Training Course presented by the special Training Division of the Oak Ridge Associated Universities.

Other Training

A member of the ORGDP-HP staff presented three 1-hr orientation lectures on the health physics aspects of handling uranium material to 238 employees of the Engineering Division.

Sixteen employees of the Equipment Test and Inspection Department of the K-25 Technical Services Division attended a 1-hr review of radiation safety principles presented by ORGDP-HP.

DISTRIBUTION

1. Administrative Offices
   Winkel, R. A./ Stief, S. S.

2. Barrier Manufacturing Div.
   Strang, F.

3- 4. Capacity Expansion Program
   Krieg, E. H., Jr.
   Trotter, T. C.

5. Employee Relations
   Vogt, J. J./Bailey, B.I.V./
   Fortney, T. G.

6- 8. Engineering Division
   Cooper, R. A.
   Kellogg, D. R.
   Patton, F. S.

9-10. Finance, Materials, and Services
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   Jamison, J. F.

11-14. Gaseous Diffusion Dev. Div.
   Collins, W. T.
   McGill, R. M.
   Pashley, J. H.
   Trammell, H. E.

15-22. K-25 Technical Services
   Bailey, J. C.
   Ferguson, J. B.
   Garber, J. W.
   Levin, R. W.
   Mundt, F. D.
   Napolitan, D. S.
   Smith, L. A.
   Weber, C. W.

23. Library

24-26. Maintenance Division
   Dean, L. A.
   McDonald, F. B., Jr.
   Nicol, J. D.

28. Operations Analysis & Planning Division
   Bradbury, J. T.

29-31. Operations Division
   Calvert, O. L.
   Legeay, A. J./
   Anderson, L. W./
   Cates, P. S./
   McCluen, W. D.
   Peterson, C. H./
   Shoemaker, J. E./
   Johnson, R. K.
   Monk, T. H.

32-34. Separation Systems Div.
   Evans, E. C.
   Flanders, I. C.
   Thompson, B. H.

35. Shift Operations
   Cantrell, T. R.

36. Sommerfeld, K. W.

36. Technical Director
   Wilcox, W. J., Jr.

37. Uranium Resource Evaluation Project
   Arendt, J. W.

38-39. ORGDP Records Department(RC)

40-41. Paducah Plant
   Baker, R. C.
   Bewley, H. D.

42. Purchasing Division
   Osborne, H. H.

43-46. Y-12 Plant
   Gambill, E. F.
   Parks, C. J.
   Vanstrum, P. R.
   White, J. C.

K/TL-625
Part 4G

ORGDP HEALTH PHYSICS PROGRAM FOR JANUARY 1977

Compiled by
J. C. Bailey
ORGDP Health Physics

February 17, 1977

UNION CARBIDE

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

prepared for the **U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION**
under **U.S. GOVERNMENT** *Contract W-7405 eng 26*

HIGHLIGHTS

FLANGE CONTAMINATION IN CASCADE IMPROVEMENT PROGRAM (Page 4). Data collection is continuing for the evaluation of possible exposure potentials presented by neptunium-237 in plant equipment.

COMPARISON OF SURVEY INSTRUMENTS AT THE OAK RIDGE GASEOUS DIFFUSION PLANT (ORGDP) (Page 4). Readings obtained with three different types of alpha survey meters were comparable, although the modes of operation and areas covered by the radiation-sensing elements are different.

TRAINING AND EDUCATION (Page 6). Ninety-seven employees attended four Health Physics training sessions presented by members of the ORGDP Health Physics Section.

CONTENTS

ORGDP HEALTH PHYSICS PROGRAM FOR JANUARY 1977

INTRODUCTION AND SUMMARY

This monthly report summarizes Health Physics (HP) activities at the Oak Ridge Gaseous Diffusion Plant (ORGDP). The HP goal is to ensure that exposures of persons to radioactive material or ionizing radiation are as low as is practicable, and below applicable radiation protection guide values. This is accomplished through evaluation of exposure levels and potentials, with appropriate recommendations to plant management.

Principal January activities included continuation of data collection concerning the presence of neptunium-237 in plant equipment, an experimental comparison of the responses of three types of alpha survey meters, health physics training for various plant groups, and continuation of survey activities.

PROGRAM ACTIVITIES

FLANGE CONTAMINATION IN CASCADE IMPROVEMENT PROGRAM

The collection of data related to the presence and exposure potential of neptunium-237 continued. To date, there is no indication that protective measures, other than the ones routinely employed to control uranium contamination, are needed.

COMPARISON OF SURVEY INSTRUMENTS AT ORGDP

An experimental comparison of readings obtained with the three types of alpha survey meters widely used at ORGDP was completed. The instruments tested were the Ludlum Model 12 air proportional counter, the Samson alpha survey meter, and the Eberline Scintillation alpha survey meter. Even though the modes of operation and the active areas of the instruments are different, the results indicated that the readings are comparable.

PROCEDURES

The Cascade Improvement Program cell changeout procedures developed by the Fabrication and Maintenance Division were reviewed by HP to ensure adequate application of health physics requirements.

The following standard practice procedures were revised to reflect a number of changes in the plant's health physics program which were implemented during the past few months:

1. SPP-B-392, *Radiation Control and Reporting,*
2. SPP-B-393, *Labeling for Radiation and Radioactive Contamination Control,*
3. SPP-B-394, *Contamination Control Guides and Standards,* and
4. SPP-B-396, *Transfer Regulations Pertaining to Radioactive Contamination.*

CONTINUING SURVEY AND SURVEILLANCE PROGRAMS

X-RAY GENERATOR AND RADIATION SOURCE EVALUATION

[Keywords: Radiation Protection]

Field modification of the Picker Minishot fluoroscopic unit located at Building K-1401 was completed.

Inspection of eight isotopic radiation sources showed no evidence of leakage and all were determined to be properly tagged and stored. In addition, one X-ray generator was inspected and found to be in compliance with HP safety procedures, and dose rates found in the vicinity of the machine were below applicable radiation protection standards.

AREA AND EQUIPMENT SURVEYS

Routine and special-request surveys are summarized in Table 1.

Table 1

CONTAMINATION SURVEYS

Work Areas	35
Lunchrooms	11
Pieces of decontaminated equipment	4,757
Miscellaneous items	869
Shipping cylinders and/or packages	153
Trailers and railcars handling uranium hexafluoride	60
Personnel checks	18
Air samples	7

URINALYSIS PROGRAM

As shown in Table 2, a number of urine samples contained uranium concentrations above the plant action guide (PAG), the level at which the source of possible exposure is investigated. The incidents investigated included two Operators and one Supervisor who were in the area where a cylinder hook-up was being made when a small quantity of trapped uranium hexafluoride (UF_6) was inadvertently released to the atmosphere; two other samples were from Operators performing routine decontamination work in Building K-1420. However, no specific source of exposure could be determined. Two samples were from one Maintenance Mechanic in the area of routine disassembly of cascade equipment in Building K-1420. Follow-up samples of these employees showed that the excretion rates had decreased to a level well below the PAG limits, indicating no significant body retention of uranium.

Table 2

URINALYSIS SAMPLES

Samples submitted for analysis	544
Analyses reported	637
Samples exceeding the plant action guide for uranium and/or alpha activity	7

TRAINING AND EDUCATION

Twelve Operations Division trainees attended a health physics orientation lecture presented by a member of the HP Section.

Forty-eight employees from the Custodial Department of the General Maintenance Division attended one of the two health physics orientation lectures presented for this group.

An HP representative presented a 1-hr lecture on health physics practices at ORGDP to 37 employees of the Separations Systems Division.

DISTRIBUTION

1. Administrative Offices
   Winkel, R. A./Stief, S. S.

2. Barrier Manufacturing Div.
   Strang, F.

3- 4. Capacity Expansion Program
   Krieg, E. H., Jr.
   Trotter, T. C.

5- 6. Employee Relations
   Vogt, J. J./Bailey, B.I.V./
   Fortney, T. G.
   Gilmore, R. D.

7- 9. Engineering Division
   Cooper, R. A.
   Kellogg, D. R.
   Patton, F. S.

10-11. Finance, Materials, and Services
   Bradshaw, M. R.
   Jamison, J. F.

12-15. Gaseous Diffusion Dev. Div.
   Collins, W. T.
   McGill, R. M.
   Pashley, J. H.
   Trammell, H. E.

16-23. K-25 Technical Services
   Bailey, J. C.
   Carpenter, L. J.
   Ferguson, J. B.
   Garber, J. W.
   Levin, R. W.
   Mundt, F. D.
   Napolitan, D. S.
   Smith, L. A.

24. Library

25-28. Maintenance Division
   Bailey, C. L.
   Dean, L. A.
   McDonald, F. B., Jr.
   Nicol, J. D.

29. Operations Analysis & Planning Division
   Bradbury, J. T.

30-32. Operations Division
   Calvert, O. L.
   Legeay, A. J./
   Anderson, L. W./
   Cates, P. S./
   McCluen, W. D./
   Peterson, C. H./
   Shoemaker, J. E./
   Johnson, R. K.
   Monk, T. H.

33-35. Separation Systems Div.
   Evans, E. C.
   Flanders, I. C.
   Thompson, B. H.

36. Shift Operations
   Cantrell, T. R.

37. Sommerfeld, K. W.

38. Technical Director
   Wilcox, W. J., Jr.

39. Uranium Resource Evaluation Project
   Arendt, J. W.

40-41. ORGDP Records Department(RC)

42-43. Paducah Plant
   Baker, R. C.
   Bewley, H. D.

44. Purchasing Division
   Osborne, H. H.

45-49. Y-12 Plant
   Davis, R. L.
   Gambill, E. F.
   Parks, C. J.
   Vanstrum, P. R.
   White, J. C.

URINALYSIS PROGRAM

Data on urinalysis samples are summarized in Table 2.

Table 2

URINALYSIS SAMPLES

	July	Year To Date
Samples submitted for analysis	559	4,178
Analyses reported	518	4,265
Samples exceeding the plant action guide for uranium and/or alpha activity	2	88

One of the urine samples that exceeded the plant action guide (PAG) limit of 0.067 mg/liter was from an operator doing field decontamination on a pipe section in Building K-33. The other was from a technician performing routine work with feed cylinders in the K-1004-L Pilot Plant. Follow-up samples in each case showed that the excretion rate had decreased to a level well below the PAG, indicating no significant body retention of uranium.

TRAINING AND EDUCATION

New Employee HP Orientation

A total of 39 new employees attended one of four HP orientation sessions presented by members of the HP staff.

Other Training

Five employees from the Fire Department of the Security and Plant Protection Division attended one emergency HP training session presented by a member of the HP staff.

DISTRIBUTION

1- 2. Administrative Offices
Parks, C. J.
Winkel, R. A./Stief, S. S.

3. Barrier Manufacturing Div.
Strang, F.

4. Capacity Expansion Program
Trotter, T. C.

5- 6. Employee Relations Div.
Gilmore, R. D.
Vogt, J. J./
Bailey, B. I. V./
Fortney, T. G.

7-10. Engineering Division
Cooper, R. A.
Kellogg, D. R.
Krieg, E. H., Jr.
Patton, F. S.

11-12. Finance, Materials, and Services Division
Jamison, J. F.
Sherrod, J. D.

13-16. Gaseous Diffusion Dev. Div.
Collins, W. T.
McGill, R. M.
Pashley, J. H.
Trammell, H. E.

17-24. K-25 Technical Services Div.
Bailey, J. C.
Carpenter, L. J.
Ferguson, J. B.
Garber, J. W.
Levin, R. W.
Mundt, F. D.
Napolitan, D. S.
Smith, L. A.

25. Library

26-29. Maintenance Division
Bailey, C. L.
Cable, R. E.
Dean, L. A.
Nicol, J. D.

30. Nuclear Division Office of Quality Assurance
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31. Operations Analysis and Planning Division
Bradbury, J. T.

32-34. Operations Division
Calvert, O. L.
Legeay, A. J./
Anderson, L. W./
Cates, P. S./
Johnson, R. K./
McCluen, W. D./
Peterson, C. H./
Shoemaker, J. E.
Monk, T. H.

35-37. Separation Systems Division
Evans, E. C.
Flanders, I. C.
Thompson, B. H.

38. Shift Operations
Cantrell, T. R.

39. Sommerfeld, K. W.

40. Technical Director
Wilcox, W. J., Jr.

41. Uranium Resource Evaluation Project
Arendt, J. W.

42. Weber, C. W.

43-44. ORGDP Records Department (RC)

45-46. Paducah Plant
Baker, R. C.
Bewley, H. D.

47. Purchasing Division
Osborne, H. H.

48-50. Y-12 Plant
Davis, R. L.
Vanstrum, P. R.
White, J. C.

K/TL-625
Part 5G

ORGDP HEALTH PHYSICS PROGRAM FOR FEBRUARY 1977

Compiled by
J. C. Bailey
ORGDP Health Physics

March 16, 1977

UNION CARBIDE

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

prepared for the **U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION**
under **U.S. GOVERNMENT** *Contract W-7405 eng 26*

HIGHLIGHTS

FLANGE CONTAMINATION IN THE CASCADE IMPROVEMENT PROGRAM (Page 4). Data collection and evaluation for the exposure potential characteristics of neptunium-237 is continuing plantwide.

IODINE-131 COLLECTION STUDIES (Page 4). A review was completed for the proposed use of iodine-131 as methyl iodide at the K-1413 Pilot Plant.

TRAINING AND EDUCATION (Page 7). Eleven employees completed one of four training sessions in preparation for certification as Radiation Monitors.

CONTENTS

ORGDP HEALTH PHYSICS PROGRAM FOR FEBRUARY 1977

INTRODUCTION AND SUMMARY

This monthly report summarizes Health Physics (HP) activities at the Oak Ridge Gaseous Diffusion Plant (ORGDP). The HP goal is to ensure that exposures of persons to radioactive material or ionizing radiation are as low as is practicable, and below applicable radiation protection guide values. This is accomplished through evaluation of exposure levels and potentials, with appropriate recommendations to plant management.

Principal February activities included continuation of data collection and evaluation concerning the presence of neptunium-237 in plant equipment, review of a proposal for the use of iodine-131 at the K-1413 Pilot Plant, the presentation of four training programs for the certification of Radiation Monitors, and continuation of expanded survey activities.

PROGRAM ACTIVITIES

FLANGE CONTAMINATION IN THE CASCADE IMPROVEMENT PROGRAM

Collection and evaluation of data pertaining to the presence and the exposure potential of neptunium-237 is continuing. Due to the extreme overload of samples for analysis in the Analytical Services Department of the K-25 Technical Services Division, a number of samples were sent to the Oak Ridge National Laboratory for analysis.

A literature search for radiation monitoring, in vivo counting, and bioassay characteristics associated with neptunium-237 was completed at the ORGDP Library using the U.S. Energy Research and Development Administration (ERDA) remote console (RECON) computer terminal. Searches were made using different subject titles under the data base Nuclear Science Abstracts, Nuclear Safety Information Center, and Environmental Science Index.

The status of the evaluation of neptunium studies and information from the three diffusion plants was reviewed by representatives from the plants, Union Carbide Corporation, Nuclear Division management, and ERDA Health and Safety Branch of the Oak Ridge Operations Office. In view of the extremely conservative values currently used as Radiation Protection Standards for neptunium exposure, the need for definitive biological studies of the uptake and retention of neptunium in mammals was emphasized.

IODINE-131 COLLECTION STUDIES

[Keywords: Iodine-131; Radioactive Wastes--Sorption]

A proposed use of iodine-131 as methyl iodide at the K-1413 Pilot Plant by personnel of the Materials and Systems Development Department of the

Gaseous Diffusion Development Division was reviewed to ensure adequate health protection measures. This test will be made with a maximum iodine-131 inventory of 10 mCi. Precautions will be carried out as in previous tests.*

AIR MONITORS

Inspection at the vendor's site of the first of nine new continuous air monitors being procured by the plant indicated that the new units will meet specifications. Delivery of all units is anticipated within the next 2 months. These units will replace old air monitors which can no longer be maintained in satisfactory condition.

COMMUNICATIONS EQUIPMENT

The installation of a process PAX telephone in the ORGDP Health Physics headquarters has greatly improved communications within plant areas. The HP PAX number is 305.

CONTINUING SURVEY AND SURVEILLANCE PROGRAMS

X-RAY GENERATOR AND RADIATION SOURCE EVALUATION

[Keywords: Radiation Protection]

Field modification of the X-ray generators requiring the installation of safety devices at ORGDP is still pending the procurement of a few essential parts.

Inspection of three isotopic radiation sources showed no evidence of leakage, and all were determined to be properly tagged and stored.

AREA AND EQUIPMENT SURVEYS

Routine and special-request surveys are summarized in Table 1.

A major survey effort on the roof of the K-25 portion of the plant was completed in preparation for the reroofing of this facility.

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* J. C. Bailey, "Iodine-131 Collection Studies," *ORGDP Health Physics Program for March 1976*, Union Carbide Corporation, Nuclear Division, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee, May 19, 1976 (K-TL-530, Part 10G). UNCLASSIFIED.

Table 1

CONTAMINATION SURVEYS

Work areas	94
Lunchrooms	6
Pieces of decontaminated equipment	3,097
Miscellaneous items	519
Shipping cylinders and/or packages	211
Trailers and railcars handling uranium hexafluoride	37
Personnel checks	27
Air samples	26

URINALYSIS PROGRAM

Data on urinalysis samples are summarized in Table 2.

Table 2

URINALYSIS SAMPLES

Samples submitted for analysis	570
Analyses reported	484
Samples exceeding the plant action guide for uranium and/or alpha activity	9

One of the samples containing uranium concentrations above the plant action guide (PAG) was obtained from a welder exposed to uranium hexafluoride (UF_6) when a cascade valve was opened, and UF_6 which had been trapped between the valve seats was inadvertently released to the atmosphere. The remaining eight samples were detected in the routine urinalysis surveillance program. Five samples were from maintenance personnel involved in doing process equipment modification (PEM) work; one sample was from an operator performing routine decontamination work in Building K-1420; and two samples were from two operators involved in routine handling and sampling of UF_6 cylinders in Building K-1423. Investigation of the eight routine samples failed to establish a specific source of exposure for any of them. Follow-up samples of these employees showed that the excretion rates had decreased to a level well below the PAG limits, indicating no significant body retention of uranium.

JOB SAFETY ANALYSIS REVIEW

A Job Safety Analysis from the Gaseous Diffusion Development Division concerning the trapping study of the element technetium was reviewed to ensure the inclusion of adequate HP practices.

TRAINING AND EDUCATION

Certification of Radiation Monitors

Eleven employees, nine from the Operations Division and two from the Finance, Materials, and Services Division, attended one of four training courses presented by HP for certification of Radiation Monitors. Eight completed certification requirements and the others were nearing completion. When these complete the course, fourteen ORGDP employees, in addition to the four HP technicians of the Health Physics Department, will be certified. ORGDP Health Physics normally provides radiation monitoring services upon request, and this function is supplemented by qualified plant personnel who handle infrequent situations where immediate limited monitoring is required off shift.

New Employee HP Orientation

As of February 1, 1977, new employees receive HP orientation given by members of the HP staff. Ninety-seven employees attended four different sessions this month.

Other Training

Twenty-one employees attended a Supervisory Training Program in which health physics principles at ORGDP were presented by a member of the HP staff.

DISTRIBUTION

1- 2. Administrative Offices
Parks, C. J.
Winkel, R. A./Stief, S. S.

3. Barrier Manufacturing Div.
Strang, F.

4- 5. Capacity Expansion Program
Krieg, E. H., Jr.
Trotter, T. C.

6- 7. Employee Relations Div.
Gilmore, R. D.
Vogt, J. J./
Bailey, B. I. V./
Fortney, T. G.

8-10. Engineering Division
Cooper, R. A.
Kellogg, D. R.
Patton, F. S.

11-12. Finance, Materials, and Services Division
Jamison, J. F.
Sherrod, J. D.

13-16. Gaseous Diffusion Dev. Div.
Collins, W. T.
McGill, R. M.
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K/TL-625
Part 6G

ORGDP HEALTH PHYSICS PROGRAM FOR MARCH 1977

Compiled by
J. C. Bailey
ORGDP Health Physics

April 20, 1977

UNION CARBIDE

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

prepared for the **U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION**
under **U.S. GOVERNMENT** *Contract W-7405 eng 26*

HIGHLIGHT

IODINE-131 COLLECTION STUDIES (Page 5). No significant health hazards resulted from the use of iodine-131 as methyl iodide at the K-1413 Pilot Plant.

CONTENTS

ORGDP HEALTH PHYSICS PROGRAM FOR MARCH 1977

INTRODUCTION AND SUMMARY

This monthly report summarizes Health Physics (HP) activities at the Oak Ridge Gaseous Diffusion Plant (ORGDP). The HP goal is to ensure that exposures of persons to radioactive material or ionizing radiation are as low as is practicable, and below applicable radiation protection guide values. This is accomplished through evaluation of exposure levels and potentials, with appropriate recommendations to plant management.

Principal March activities included continuation of data collection and evaluation concerning the presence of neptunium-237 in plant equipment, completion of the use of iodine-131 at the K-1413 Pilot Plant without any significant health physics incidents, review and study of all ORGDP radioactive solid waste disposal and storage sites, and continuation of expanded survey activities.

PROGRAM ACTIVITIES

SOLID LOW-LEVEL RADIOACTIVE WASTE

At the request of the U.S. Energy Research and Development Administration (ERDA), a review of all ORGDP radioactive solid waste disposal methods and storage areas is being prepared by Health Physics and the ORGDP Environmental Protection Group.

IODINE-131 COLLECTION STUDIES

[Keywords: Iodine-131; Radioactive Wastes--Sorption]

Personnel of the Materials and Systems Development Department of the Gaseous Diffusion Development Division continued their studies on the removal of radioactive iodine from fuel-reprocessing off-gases. The most recent test, utilizing radioactive iodine as methyl iodide, was completed without any health physics incident, and the highest of the long-term air samples indicated only 2% of the ERDA guide for soluble iodine-131 in air for a controlled area.

CONTINUING SURVEY AND SURVEILLANCE PROGRAMS

X-RAY GENERATOR AND RADIATION SOURCE EVALUATION

[Keywords: Radiation Protection]

X-ray films placed in the vicinity of the Medical X-Ray Unit in Building K-1003 for 2 months verified that there was no potential for significant exposure in areas adjacent to this facility.

Inspection of eight isotopic radiation sources showed no evidence of leakage, and all were determined to be properly tagged and stored.

AREA AND EQUIPMENT SURVEYS

Routine and special-request surveys are summarized in Table 1.

Table 1

CONTAMINATION SURVEYS

Work areas	38
Lunchrooms	4
Pieces of decontaminated equipment	1,966
Miscellaneous items	1,891
Shipping cylinders and/or packages	270
Trailers and railcars handling uranium hexafluoride	75
Personnel checks	29
Job air samples	23

URINALYSIS PROGRAM

Data on urinalysis samples are summarized in Table 2.

Table 2

URINALYSIS SAMPLES

Samples submitted for analysis	720
Analyses reported	759
Samples exceeding the plant action guide for uranium and/or alpha activity	10

Three of the samples containing uranium concentrations above the plant action guide (PAG) were detected in the routine urinalysis surveillance program: an operator performing decontamination work, a maintenance mechanic performing compressor disassembly work, and a maintenance mechanic performing routine cascade maintenance work. One sample was from an operator who was decontaminating a product cylinder pigtail when a small amount of uranium hexafluoride (UF_6) was inadvertently released. The remaining six samples were from two operators in Building K-1233 and three operators in Building K-413 who experienced exposures as a result of a UF_6 release in Building K-413 where a defective cylinder valve failed to seat properly and UF_6 was inadvertently released to the atmosphere. Follow-up sample results from seven of the nine employees involved are incomplete at this time. Follow-up samples of the two remaining employees showed that excretion rates had decreased to a level well below the PAG limits, indicating no significant body retention of uranium.

A formal investigation report on the K-413 release is being prepared by the Operations Division.

TRAINING AND EDUCATION

Certification of Radiation Monitors

The three employees reported last month to have completed part of their requirements for certification as radiation monitors have completed all requirements.

New Employee HP Orientation

Ninety-six new employees attended one of four HP orientation sessions presented by members of the Health Physics staff.

Other Training

Seven cascade operator trainees participated in an HP training session presented by a representative of the HP staff, and eleven employees of the Development Maintenance Department of the Fabrication and Maintenance Division attended a 1-hr orientation lecture in HP principles.

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K/TL-625
Part 7G

ORGDP HEALTH PHYSICS PROGRAM FOR APRIL 1977

Compiled by
J. C. Bailey
ORGDP Health Physics

May 18, 1977

UNION CARBIDE

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

prepared for the **U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION**
under **U.S. GOVERNMENT** *Contract W-7405 eng 26*

HIGHLIGHTS

SOLID LOW-LEVEL RADIOACTIVE WASTE (Page 4). A final report K/TL-661, *A Study of Low-Level Radioactive Solid Waste Disposal and Storage Areas at the Oak Ridge Gaseous Diffusion Plant*, was issued by the combined efforts of the ORGDP Environmental Management Group and ORGDP Health Physics.

X-RAY GENERATOR AND RADIATION SOURCE EVALUATION (Page 4). Calculations were made to determine shielding requirements for a new 420-kV Phillips X-Ray unit to be purchased for use at the K-1401 X-ray Facility of the Equipment Test and Inspections Section.

CONTENTS

ORGDP HEALTH PHYSICS PROGRAM FOR APRIL 1977

INTRODUCTION AND SUMMARY

This monthly report summarizes Health Physics (HP) activities at the Oak Ridge Gaseous Diffusion Plant (ORGDP). The HP goal is to ensure that exposures of persons to radioactive material or ionizing radiation are as low as is practicable, and below applicable radiation protection guide values. This is accomplished through evaluation of exposure levels and potentials, with appropriate recommendations to plant management.

Principal April activities include issuance of a solid low-level radioactive waste report and calculations to determine required thickness of barriers for a 420-kV X-ray unit.

PROGRAM ACTIVITIES

SOLID LOW-LEVEL RADIOACTIVE WASTE

A final report, K/TL-661,* was issued by the combined efforts of the ORGDP Environmental Management Group and ORGDP Health Physics. This report summarizes the storage and disposal areas of low-level radioactive waste, their operating practices, and recommendations needed to ensure that low-level solid radioactive waste is effectively managed at ORGDP.

CONTINUING SURVEY AND SURVEILLANCE PROGRAMS

X-RAY GENERATOR AND RADIATION SOURCE EVALUATION

[Keywords: Radiation Protection]

Calculations were made to determine shielding requirements for a new 420-kV Phillips X-ray unit to be purchased for use at the K-1401 X-ray Facility of the Equipment Test and Inspection Section. The X-ray Facility will undergo extensive modifications to provide additional shielding and to increase the overhead clearance of the facility.

Field modification of the Dick film badge X-ray unit located at Building K-1021 was completed.

AREA AND EQUIPMENT SURVEYS

Routine and special-request surveys are summarized in Table 1.

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*K-25 Technical Services Division, *A Study of Low-Level Radioactive Solid Waste Disposal and Storage Areas at the Oak Ridge Gaseous Diffusion Plant*, Union Carbide Corporation, Nuclear Division, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee, April 22, 1977 (K/TL-661). UNCLASSIFIED.

Table 1

CONTAMINATION SURVEYS

Work areas	29
Lunchrooms	4
Pieces of decontaminated equipment	2,092
Miscellaneous items	1,873
Shipping cylinders and/or packages	275
Trailers and railcars handling uranium hexafluoride	74
Personnel checks	98
Job air samples	38

URINALYSIS PROGRAM

Data on urinalysis samples are summarized in Table 2.

Table 2

URINALYSIS SAMPLES

Samples submitted for analysis	581
Analyses reported	599
Samples exceeding the plant action guide for uranium and/or alpha activity	19

One of the samples containing uranium concentrations above the plant action guide (PAG) was from an instrument mechanic. This mechanic was drilling out a plug on a sample manifold in Building K-1131 when a small quanitity of uranium hexafluoride (UF_6) trapped in the manifold line was inadvertently released to the atmosphere. One sample was from an operator in Building K-1420 cleaning an accumulation of uranium powder from a vacuum bellows. Seventeen were from one employee who experienced exposure as the result of a UF_6 release in Building K-413; this incident was reported in the March Health Physics report. The rate at which urinary-uranium excretion decreased was abnormally low in this case, and was tentatively associated with a preexisting respiratory condition. An evaluation of the sample results indicated that the employee received less than 1% of the permissible annual exposure to uranium with respect to the lung. Follow-up samples show that all employees, including the incomplete samples referred to in the March report, are now well below the PAG limits, indicating no significant body retention of uranium.

TRAINING AND EDUCATION

New Employee HP Orientation

Sixty-two new employees attended one of four HP orientation sessions presented by members of the Health Physics staff.

Other Training

Sixty-three employees from the K-1401 Compressor and Machine Shops of the Fabrication and Maintenance Division attended one of four HP presentations covering specific shop practices and procedures for identifying contaminated equipment.

Seventeen employees of the K-1423 Toll Enrichment Facility attended a 1-hr HP orientation lecture given by a member of the Health Physics staff.

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K/TL-625
Part 8G

ORGDP HEALTH PHYSICS PROGRAM FOR MAY 1977

Compiled by
J. C. Bailey
ORGDP Health Physics

June 20, 1977

UNION CARBIDE

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

prepared for the **U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION**
under **U.S. GOVERNMENT** *Contract W-7405 eng 26*

HIGHLIGHTS

U. S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION REVIEW OF HEALTH PHYSICS PROGRAM (Page 4). The annual review of the Oak Ridge Gaseous Diffusion Plant Health Physics (HP) program by the Health and Safety Branch of the U. S. Energy Research and Development Administration was completed.

TRAINING AND EDUCATION (Page 6). The HP Staff performed an unusually wide variety of training activities.

CONTENTS

ORGDP HEALTH PHYSICS PROGRAM FOR MAY 1977

INTRODUCTION AND SUMMARY

This monthly report summarizes Health Physics (HP) activities at the Oak Ridge Gaseous Diffusion Plant (ORGDP). The HP goal is to ensure that exposures of persons to radioactive material or ionizing radiation are as low as is practicable, and below applicable radiation protection guide values. This is accomplished through evaluation of exposure levels and potentials, with appropriate recommendations to plant management.

Principal May activities included a U. S. Energy Research and Development Administration (ERDA) audit of the HP program, attendance at a low-level radioactive waste management symposium, and continuation of HP training of plant employees.

PROGRAM ACTIVITIES

U. S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION REVIEW OF HEALTH PHYSICS PROGRAM

[Keywords: Audit--Health Physics]

The annual ERDA review of the plant's HP program was concluded. Recommendations from ERDA have not yet been received.

URANIUM HEXAFLUORIDE RELEASE

[Keywords: Uranium--Releases]

A uranium hexafluoride (UF_6) release, estimated at less than 5 lb of UF_6, occurred during the changeout of an expansion bellows in the B-stream bypass piping in Building K-902-5. It was attributed to a deposit of UF_6 in the piping due to low ambient temperature. As a result of this experience, no protective insulated housing will be removed preceding such a job until the UF_6 has been evacuated from the system. As discussed under *Urinalysis Program* below, 20 employees showed urinary uranium excretion above the plant action guide (PAG), but none exceeded the ERDA Radiation Guide for the week.

ATTENDANCE AT MEETINGS

A member of the HP Staff attended a symposium entitled *Management of Low-Level Radioactive Waste* held in Atlanta, Georgia. Major subjects covered included packaging, transportation, and burial technology of low-level radioactive waste; operational monitoring; occupational exposure; and design and operation of radioactive waste equipment.

AIR MONITORS

Six of nine new continuous air monitors procured have been received and will be ready for plant use as soon as sampling and calibration tests are completed.

CONTINUING SURVEY AND SURVEILLANCE PROGRAMS

X-RAY GENERATOR AND RADIATION SOURCE EVALUATION

Inspection of 12 isotopic radiation sources showed no evidence of leakage, and all were determined to be properly tagged and stored. In addition, 5 X-ray generators were inspected and found to be in compliance with HP safety procedures, and dose rates found in the vicinity of the machine were below applicable radiation protection standards.

AREA AND EQUIPMENT SURVEYS

Routine and special-request surveys are summarized in Table 1.

Table 1

CONTAMINATION SURVEYS

	May	Year To Date
Work areas	30	226
Lunchrooms	10	35
Pieces of decontaminated equipment	2,757	14,670
Miscellaneous items	2,449	7,601
Shipping cylinders and/or packages	316	1,225
Trailers and railcars handling uranium hexafluoride	109	355
Personnel checks	10	182
Job air samples	8	102
Shift length air samples	953	4,528

URINALYSIS PROGRAM

Data on urinalysis samples are summarized in Table 2.

Table 2

URINALYSIS SAMPLES

	May	Year To Date
Samples submitted for analysis	715	3,130
Analyses reported	681	3,160
Samples exceeding the plant action guide for uranium and/or alpha activity	33	78

Twenty of the urine samples which were above the PAG of 0.067 mg/liter were from 19 maintenance employees and 5 operations employees in the area when UF_6 was inadvertently released to the atmosphere during an expansion bellows changeout in Building K-902-5, as described in a preceding section of this report. One was from a test operations employee in Building K-1210 where a leaking gasket on a chemical trap resulted in a small quantity of UF_6 being released to the atmosphere. Two were from employees in barrier testing in Building K-1004-L; one of these occurred when an employee entered a UF_6 release area to determine the exact location of the release. No specific source of exposure could be determined for the other employee. Three were from two operators in Building K-1420 involved in converter disassembly and equipment decontamination; however, no specific source of exposure could be determined. One was from an operator performing routine sampling and transferring UF_6 in Building K-1423 and one was from a maintenance mechanic dismantling compressors in Building K-1420. Follow-up samples from all employees showed that the excretion rates had decreased to a level well below the PAG limits, indicating no significant body retention of uranium.

TRAINING AND EDUCATION

During May, the HP Staff performed an unusually wide variety of training activities. These activities included health physics orientation sesstions for new employees and for various plant groups, radiation safety film procurement and showing, training of instrument mechanics in radiation instrumentation principles, and emergency-personnel training. A total of 166 employees were involved in these sessions.

New Employee HP Orientation

A total of 50 new employees attended one of three HP orientation sessions presented by members of the Health Physics Staff.

Other Training

A total of 46 employees--31 from the Equipment Test and Inspection Department, 13 from other departments of the Technical Services Division, and two from the Security and Plant Protection Division--viewed a safety film entitled *"The Double Edged Sword."* This is an excellent film presentation dealing with precautions needed to operate X-ray diffraction units safely. The film is available from ORGDP Health Physics.

Fourteen employees from the Instrument Maintenance Department attended a 1-hr review of radiation safety principles presented by ORGDP-HP as the initial session of a projected 6-hr course on radiation instrumentation principles for instrument mechanics.

Five employees from the Fire Department of the Security and Plant Protection Division attended an emergency HP training session presented by a member of the HP Staff.

Three orientation lectures covering HP principles and information on safe handling of uranium material were presented by members of the HP Staff. Participants in these lectures were 7 employees from the Separation Systems Division, 31 employees from the K-32 Maintenance Department, and 13 employees from the Electrical Maintenance Department of the Maintenance Division.

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K/TL-625
Part 9G

ORGDP HEALTH PHYSICS PROGRAM FOR JUNE 1977

Compiled by
J. C. Bailey
ORGDP Health Physics

July 20, 1977

UNION CARBIDE

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

prepared for the **U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION**
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HIGHLIGHTS

TECHNETIUM IN DIFFUSION PLANTS (Page 4). An *ad hoc* committee from the three diffusion plants was activated to coordinate information and investigative efforts regarding technetium in the diffusion plants.

X-RAY GENERATOR AND RADIATION SOURCE EVALUATION (Page 5). A safety review of X-ray machines and radiation sources at the Oak Ridge Gaseous Diffusion Plant, requested by the U.S. Energy Research and Development Administration, was completed.

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ORGDP HEALTH PHYSICS PROGRAM FOR JUNE 1977

INTRODUCTION AND SUMMARY

This monthly report summarizes Health Physics (HP) activities at the Oak Ridge Gaseous Diffusion Plant (ORGDP). The HP goal is to ensure that exposures of persons to radioactive material or ionizing radiation are as low as is practicable, and below applicable radiation protection guide values. This is accomplished through evaluation of exposure levels and potentials, with appropriate recommendations to plant management.

Principal June activities included formation of a technetium *ad hoc* committee from the three diffusion plants, a safety review requested by the U.S. Energy Research and Development Administration (ERDA) of X-ray machines and radioactive sources, and continuation of HP training of plant employees.

PROGRAM ACTIVITIES

TECHNETIUM IN DIFFUSION PLANTS

As noted in K/TL-530, Part 5G,* the fission product technetium is present in uranium hexafluoride (UF_6) derived from reactor return materials and processed in the diffusion plants. Since technetium is present in the cascades of all of the diffusion plants, each site has carried out various evaluations to better define radiation exposure potentials and the impact of this material on plant processes.

At the request of Mr. R. W. Levin, Director of the K-25 Technical Services Division, an *ad hoc* committee representing the HP and laboratory chemical groups of the three diffusion plants convened at ORGDP in June 1977 to exchange information and coordinate activities concerning technetium. As a result of the discussions, it was agreed that the committee would continue to function with the objectives of (1) coordinating investigative efforts concerning technetium at the three diffusion plants, (2) providing a means for exchange of information, and (3) arriving at common criteria for HP control and evaluation of technetium problems. With respect to the last of these objectives, it was noted that adoption of common criteria would not necessarily entail utilization of identical control methods, inasmuch as the potentials for exposure at the various sites may not be the same.

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*Bailey, J. C., *ORGDP Health Physics Program for November 1975*, Union Carbide Corporation, Nuclear Division, Oak Ridge Gaseous Diffusion, Oak Ridge, Tennessee, December 17, 1975 (K/TL-530, Part 5G). UNCLASSIFIED.

EMERGENCY PREPAREDNESS (RADIATION ALARM EVALUATION)

Radiation alarm units of the type used at ORGDP for the detection of a possible criticality accident have a coating inside the radiation-detecting chambers to make them sensitive to neutrons--primarily thermal neutrons--as well as to gamma radiation. In the past, tests of units in the field have been made using gamma radiation sources only. Sensitivity to neutrons has been done only in the shop, since the neutron test procedure requires a relatively bulky moderator assembly to slow down the fast neutrons generated by the source to the low energies required to activate the detectors. It is now proposed to carry out field tests of the units for both gamma and neutron radiation, and a neutron moderator assembly is being fabricated by the Instrument Maintenance Department to be used in these tests. Preliminary tests with this Source Assembly and some of the units will be done by ORGDP-HP and the Instrument Maintenance Department to determine test criteria for the assembly.

CONTINUING SURVEY AND SURVEILLANCE PROGRAMS

X-RAY GENERATOR AND RADIATION SOURCE EVALUATION

[Keywords: X-Rays; Radiation Protection]

As a result of an X-ray exposure at another ERDA installation (Donner Laboratory), ERDA-Oak Ridge Operations requested an evaluation of all radiation source devices to assure that a similar incident could not occur here. A key factor in the incident was that failure of a single component in the circuit rendered control and warning indicators inactive. This permitted the generation of X-rays upon activation of the main power contacts without activation of other control or any indication that the unit was active.

The ORGDP review, carried out by the Electrical Engineering, Instrument Maintenance, and HP groups, indicated that although a similar failure of the X-ray machine was possible on five radiation units, administrative precautions and external radiation detecting devices utilized routinely in their operation preclude a similar exposure here. The occurrence at Donner Laboratory has emphasized the importance of the ORGDP X-ray machine and radiation source uprating program, and this program is continuing on a high-priority basis.

The status of the X-ray machines and radiation sources relative to the uprating program is shown in Table 1.

Table 1

STATUS OF X-RAY EQUIPMENT AND ISOTOPIC SOURCES

Unit	Property No.	Use	Responsible Department	Percent of Bills of Material Completed	Percent Completion in Shop	Percent of Field Completion
Westinghouse	253862	Medical	1090	100	0	0
Dick	232785	Film Badge	1094	100	100	100
Phillips	244182	Diffraction	1323	90	17	0
Siemens	259819	Diffraction	1323	90	17	0
Norelco	250073	Diffraction	1323	100	100	0
Picker	193615	Diffraction	1323		Stored - Not in Use	
Seifert	245328	Radiographic	1312	90	30	0
Phillips	268867	Radiographic	1312	95	40	0
Norelco	252510	Radiographic	1312	100	50	0
Phillips	270272	Radiographic	1312	90	30	0
Picker Andrex	None	Radiographic	1312	(a)	(a)	(a)
Picker Andrex	None	Radiographic	1312	(a)	(a)	(a)
Picker	255837	Fluoroscopic	1312	100	100	100
Iridium-192 Source	--	Radiographic	1312	None	100	100
Cobalt-60 Source	--	Radiographic	1312	None	100	100
Cobalt-60 Source	--	Film Calibration	1317	0(b)	0(b)	0(b)
Cobalt-60 Source	--	Emergency	1317		Stored - Not in Use	

(a)Modified earlier at the Y-12 Plant to meet engineering specifications.

(b)Previously reported as 100% Bills of Materials Completed and 17% Completion in Shop in the Monthly Report of December 1976.* However, due to a misinterpretation of oral and written instructions, the materials for this unit were not ordered.

*Bailey, J. C., *ORGDP Health Physics Program for December 1976*, Union Carbide Corporation, Nuclear Division, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee, January 19, 1977 (K/TL-625, Part 3G). UNCLASSIFIED.

AREA AND EQUIPMENT SURVEYS

Routine and special-request surveys are summarized in Table 2.

Table 2

CONTAMINATION SURVEYS

Work areas	31
Lunchrooms	8
Pieces of decontaminated equipment	2,617
Miscellaneous items	1,513
Shipping cylinders and/or packages	215
Trailers and railcars handling uranium hexafluoride	93
Personnel checks	34
Air samples	6

URINALYSIS PROGRAM

Data on urinalysis samples are summarized in Table 3.

Table 3

URINALYSIS SAMPLES

	June	Year To Date
Samples submitted for analysis	489	3,619
Analyses reported	587	3,747
Samples exceeding the plant action guide for uranium and/or alpha activity	8	86

Four of the urine samples which were above the plant action guide (PAG) limits of 0.067 mg/liter were from two Operations employees who were plugging a leaking valve bellows on Cell 7 "A" evacuation valve in Building K-402-9. One of the other samples was from a Maintenance employee assigned to sawing out a 6-in. valve and several pipe sections. Two samples were from two Operations employees who were exposed to a leaking cylinder

in Building K-1420. All of the employees involved were reported to have been using appropriate respiratory protection, and no specific cause for the elevated urinalysis results could be cited. An additional urinalysis result above the PAG involved a routine urinalysis for an Operations Division employee. No specific source of exposure could be determined. Follow-up samples from all employees showed that the excretion rates had decreased to a level well below the PAG limits, indicating no significant body retention of uranium.

TRAINING AND EDUCATION

New Employee HP Orientation

A total of 101 new employees attended one of four HP orientation sessions presented by members of the HP staff.

Other Training

Forty-nine employees from the Separation Systems Division and 19 cascade operator trainees attended one of five HP orientation lectures presented by a member of the HP staff covering principles and information on safe handling of uranium material.

Nine employees from the Fire Department of the Security and Plant Protection Division attended one of two emergency HP training sessions presented by a member of the HP staff.

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44-45. ORGDP Records Department (RC)

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Bewley, H. D.

48. Purchasing Division
Osborne, H. H.

49-51. Y-12 Plant
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Vanstrum, P. R.
White, J. C.

K/TL-625
Part 10G

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ORGDP HEALTH PHYSICS PROGRAM FOR JULY 1977

Compiled by
J. C. Bailey
ORGDP Health Physics

August 17, 1977

UNION CARBIDE

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

prepared for the **U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION**
under **U.S. GOVERNMENT** *Contract W-7405 eng 26*

HIGHLIGHTS

SAFETY ANALYSIS REPORT ON HANDLING URANIUM HEXAFLUORIDE (Page 4). The Oak Ridge Gaseous Diffusion Plant (ORGDP) Health Physics assisted in the preparation of a safety analysis report on handling uranium hexafluoride (UF_6) at ORGDP by developing those sections dealing with the health physics aspects in the UF_6 handling operations.

CONTENTS

ORGDP HEALTH PHYSICS PROGRAM FOR JULY 1977

INTRODUCTION AND SUMMARY

This monthly report summarizes Health Physics (HP) activities at the Oak Ridge Gaseous Diffusion Plant (ORGDP). The HP goal is to ensure that exposures of persons to radioactive material or ionizing radiation are as low as is practicable, and below applicable radiation protection guide values. This is accomplished through evaluation of exposure levels and potentials, with appropriate recommendations to plant management.

Principal July activities included preparation of an ORGDP uranium hexafluoride (UF_6) handling report, a study of the production of bremsstrahlung by technetium-99, and continuation of HP training of plant employees.

PROGRAM ACTIVITIES

SAFETY ANALYSIS REPORT ON HANDLING URANIUM HEXAFLUORIDE

At the request of the U.S. Energy Research and Development Administration (ERDA), ORGDP is currently preparing a safety analysis report covering the handling of UF_6 at the plant. The effort is being coordinated by the Engineering Division. ORGDP Health Physics assisted in the preparation of this report by developing those sections dealing with the health physics aspects of the UF_6 handling operations.

TECHNETIUM IN DIFFUSION PLANTS

A brief study of the production of bremsstrahlung (X-rays) radiation by technetium-99 at ORGDP was completed by HP.* It was concluded that any radiation exposure potential to personnel from technetium-99 would come from the betas emitted and not from the small amount of bremsstrahlung produced. Therefore, the presence of this electromagnetic radiation around a technetium-99 source in air, or any other medium commonly found in plant processes, can be neglected when considering possible radiation exposure potential.

Calibration of the Y-12 Plant whole-body counter for technetium-99 is being studied so that the radiation level in ORGDP personnel can be counted using the small amount of bremsstrahlung radiation produced inside the body. To calibrate the counter, 10 vials containing a known amount of technetium-99 solution will be placed in the two lung cavities of a tissue-equivalent phantom.

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*Rodriguez, R. J., Letter to R. W. Levin, *Production of Bremsstrahlung (X-Rays) Radiation by Technetium-99 at ORGDP*, Union Carbide Corporation, Nuclear Division, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee, July 25, 1977.

EMERGENCY PREPAREDNESS (RADIATION ALARM EVALUATION)

As noted in the Health Physics report for last month,* a small neutron moderator assembly was fabricated in an effort to provide a portable device for field testing the neutron response of the ORGDP criticality alarms. Tests of the unit indicated that the moderator was not large enough to moderate sufficient neutrons to activate the alarm units. A larger neutron moderator assembly is now being developed.

CONTINUING SURVEY AND SURVEILLANCE PROGRAMS

X-RAY GENERATOR AND RADIATION SOURCE EVALUATION

[Keywords: X-Rays; Radiation Protection]

Inspection of seven isotopic radiation sources showed no evidence of leakage, and all were determined to be properly tagged and stored. In addition, four of five X-ray generators inspected were determined to be in compliance with HP safety procedures, and dose rates found in the vicinity of the machine were below applicable radiation protection standards. The current control or the current indicator on the other unit was not functioning properly, as was determined on a preoperational check. The unit was not placed in service and will be repaired prior to use.

AREA AND EQUIPMENT SURVEYS

Routine and special-request surveys are summarized in Table 1.

Table 1

CONTAMINATION SURVEYS

	July	Year To Date
Work areas	16	273
Lunchrooms	1	44
Pieces of decontaminated equipment	2,688	19,975
Miscellaneous items	1,720	10,824
Shipping cylinders and/or packages	215	1,655
Trailers and railcars handling uranium hexafluoride	84	532
Personnel checks	39	255
Spot air samples	11	119
Shift length air samples	900	6,460

*Bailey, J. C., *ORGDP Health Physics Program for June 1977*, Union Carbide Corporation, Nuclear Division, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee, July 20, 1977 (K/TL-625, Part 9G). UNCLASSIFIED.

K/TL-625
Part 11G

ORGDP HEALTH PHYSICS PROGRAM FOR AUGUST 1977

Compiled by
J. C. Bailey
ORGDP Health Physics

September 20, 1977

UNION CARBIDE

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

prepared for the **U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION**
under **U.S. GOVERNMENT** *Contract W-7405 eng 26*

HIGHLIGHTS

TECHNETIUM IN DIFFUSION PLANTS (Page 4). Experiments demonstrated that the bremsstrahlung radiation produced by technetium-99 beta particles can be detected by the Y-12 in-vivo body counter with sufficient sensitivity to detect 10% of the maximum permissible lung burden of insoluble technetium-99.

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ORGDP HEALTH PHYSICS PROGRAM FOR AUGUST 1977

INTRODUCTION AND SUMMARY

This monthly report summarizes Health Physics (HP) activities at the Oak Ridge Gaseous Diffusion Plant (ORGDP). The HP goal is to ensure that exposures of persons to radioactive material or ionizing radiation are as low as is practicable, and below applicable radiation protection guide values. This is accomplished through evaluation of exposure levels and potentials, with appropriate recommendations to plant management.

Principal August activities included experiments to demonstrate the detection of bremsstrahlung radiation produced by technetium-99 betas in the Y-12 Plant in-vivo body counter, and continuation of HP survey activities.

PROGRAM ACTIVITIES

TECHNETIUM IN DIFFUSION PLANTS

[Keywords: Technetium-99, Radiation Protection]

Experiments demonstrated that the bremsstrahlung radiation produced by technetium-99 beta particles can be detected by the Y-12 in-vivo body counter with sufficient sensitivity to detect 10% of the maximum permissible lung burden of insoluble technetium-99.

The experiments were carried out at Y-12 by representatives of the Y-12 Radiation Safety Department and ORGDP Health Physics. For purposes of this evaluation a soluble compound of technetium-99 was dissolved in water which was contained in a number of small plastic vials. The bremsstrahlung spectrum anticipated from such a dispersal should correspond closely to that resulting from dispersal of an insoluble technetium-99 compound in soft tissue of the body. Quantities of technetium corresponding to 13%, 66%, and 107% of the maximum permissible lung burden (13 μCi) for insoluble technetium-99 were uniformly distributed in the two lung cavities of a tissue equivalent phantom and counted for 20 min each.

Although the analysis of the data is as yet incomplete, a preliminary examination indicated that internal exposure to insoluble technetium-99 can be evaluated adequately using the Y-12 whole body counter.

EMERGENCY PREPAREDNESS (RADIATION ALARM EVALUATION)

As noted in the Health Physics report for last month,* efforts are under way to develop a portable device for field testing the neutron response

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*Bailey, J. C., *ORGDP Health Physics Program for July 1977*, Union Carbide Corporation, Nuclear Division, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee, August 17, 1977 (K/TL-625, Part 10G). UNCLASSIFIED.

of the ORGDP criticality alarms. The unit will consist of a neutron source surrounded by sufficient neutron moderating material to provide a sufficient number of thermal neutrons to activate the alarm units. A second such system failed, as did the first, to trigger the alarm feature of the criticality alarms. Additional moderator, to the maximum amount compatible with the portability requirements of the field test unit, was being added to the present device at the close of this report period.

CONTINUING SURVEY AND SURVEILLANCE PROGRAMS

X-RAY GENERATOR AND RADIATION SOURCE EVALUATION

[Keywords: X-Rays; Radiation Protection]

Inspection of six isotopic radiation sources showed no evidence of leakage, and all were determined to be properly tagged and stored. One HP source (0.1 millicurie of radium-226) which is commonly used for instrument calibration and radiation demonstration showed trace quantities of alpha contamination on its surface and was sent to the Oak Ridge National Laboratory (ORNL) for disposal. In addition, four X-ray generators inspected were determined to be in compliance with HP safety procedures, and dose rates found in the vicinity of the machine were below applicable radiation protection standards.

AREA AND EQUIPMENT SURVEYS

Routine and special-request surveys are summarized in Table 1.

Table 1

CONTAMINATION SURVEYS

	August	Year To Date
Work areas	26	299
Lunchrooms	1	45
Pieces of decontaminated equipment	2,296	22,271
Miscellaneous items	1,214	12,038
Shipping cylinders and/or packages	200	1,855
Trailers and railcars handling uranium hexafluoride	86	618
Personnel checks	31	286
Spot air samples	14	133
Shift length air samples	706	7,166

URINALYSIS PROGRAM

Data on urinalysis samples are summarized in Table 2.

Table 2

URINALYSIS SAMPLES

	August	Year To Date
Samples submitted for analysis	838	5,017
Analyses reported	744	5,019
Samples exceeding the plant action guide for uranium and/or alpha activity	7	95

One of the urine samples containing uranium concentrations above the plant action guide (PAG) limit (0.067 mg/liter for uranium and/or 10 d/m/100 ml for alpha) was from an operator who had performed routine field decontamination work in Building K-1420. One was from a welder who had done routine process equipment modification (PEM) welding. Two samples were from one operator who had done routine transfer and sampling of uranium hexafluoride (UF_6) in the K-1423 Toll Enrichment Facility. Three were from two test operations employees who were present in Building K-1210 when a defective cylinder valve permitted UF_6 gas to escape to the atmosphere when the cylinder was heated. Follow-up samples in each case showed that the excretion rate had decreased to a level well below the PAG, indicating no significant body retention of uranium.

TRAINING AND EDUCATION

New Employee HP Orientation

Fifty-nine new employees attended one of four HP orientation sessions presented by members of the HP staff.

Other Training

Five employees from the Fire Department of the Security and Plant Protection Division attended one emergency HP training session presented by a member of the HP staff.

Eleven employees from the Compressor Shop of Building K-1401, 12 employees from the K-1401 Machine Shop, and 9 employees from the Maintenance Shop of K-1004-L attended one of three 1-hr HP orientation lectures presented by a member of the HP staff.

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49-51. Y-12 Plant
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Vanstrum, P. R.
White, J. C.

K/TL-625
Part 12G

ORGDP HEALTH PHYSICS PROGRAM FOR SEPTEMBER 1977

Compiled by
J. C. Bailey
ORGDP Health Physics

October 19, 1977

UNION CARBIDE

OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

prepared for the **U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION**
under **U.S. GOVERNMENT** *Contract W-7405 eng 26*

HIGHLIGHTS

DEPARTMENT OF ENERGY REVIEW OF HEALTH PHYSICS PROGRAM (Page 4). The Department of Energy appraisal of the Health Physics Program at the Oak Ridge Gaseous Diffusion Plant (ORGDP) was received.

EMERGENCY PREPAREDNESS (Page 5). A portable device was sucessfully developed for field testing the response of the ORGDP criticality alarms to neutron radiation.

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ORGDP HEALTH PHYSICS PROGRAM FOR SEPTEMBER 1977

INTRODUCTION AND SUMMARY

This monthly report summarizes Health Physics (HP) activities at the Oak Ridge Gaseous Diffusion Plant (ORGDP). The HP goal is to ensure that exposures of persons to radioactive material or ionizing radiation are as low as is practicable, and below applicable radiation protection guide values. This is accomplished through evaluation of exposure levels and potentials, with appropriate recommendations to plant management.

Principal September activities included development of plans to meet the Department of Energy (DOE) HP appraisal recommendations, successful development of a neutron moderator portable assembly for testing ORGDP criticality alarms, and continuation of HP survey activities.

PROGRAM ACTIVITIES

DEPARTMENT OF ENERGY REVIEW OF HEALTH PHYSICS PROGRAM

[Keywords: Audit--Health Physics]

The DOE appraisal of the HP Program at ORGDP was received. Recommendations were directed toward (1) completion of the evaluation of possible exposure potentials from airborne transuranic materials during cell changeout, disassembly, and salvage operations; and (2) continuation of the HP Program documentation. Specific references dealt with issuance of HP internal procedures related to personnel monitoring programs--namely, the film badge, bioassay, and in-vivo monitoring programs--and the anticipated revision and issuance of SPP-B-340, *Scrap Metal Control Program*.

With respect to the evaluation of transuranic elements in plant equipment, it is noteworthy that none of approximately 100 air samples analyzed to date have given any positive indication of the presence of these materials in air. The methods employed, however, were not sufficiently sensitive to permit accurate evaluations at fractional levels of the applicable DOE Radiation Protection Standards. The Health Physics staff and the Analytical Services Department have been actively engaged in efforts to increase the sensitivity of the sampling and analytical techniques to permit accurate evaluation of the presence of these materials in the air at levels well below these standards. Ultrahigh volume air samplers with large-area filters have been procured by HP to increase by a factor of 5 the volume of air which may be sampled during a given sampling operation. The Analytical Services Department has for several months had on order new surface barrier alpha radiation detectors which permit analysis of the characteristic alpha energies of the various alpha emitters; this provides highly definitive measurements and marked improvement in

sensitivity over other counting methods. The new units will increase by a factor of 5 the number of samples which can be processed in a given time.

Revision of the SPP-B-340, *Scrap Metal Control Program,* was completed and the draft was transmitted to the Systems and Procedures Group for distribution for plant review prior to formal issuance.

TECHNETIUM IN DIFFUSION PLANTS

[Keywords: Technetium-99, Radiation Protection]

Six technetium-99 source standards of different activities were procured to aid in calibrating the beta-gamma radiation detection instruments routinely used by HP personnel to assure adequate response to the low-energy beta radiation of this isotope.

EMERGENCY PREPAREDNESS

Radiation Alarm Testing

The development of a portable device for field testing the response of the ORGDP criticality alarms to neutron radiation, as reported in the last two Health Physics Monthly Reports, was successfully concluded. A procedure was also developed to assure safe use and handling of the neutron source in conjunction with the new portable assembly.

Radiation Alarm and Recording Criteria

A representative of the HP staff is serving on a task group under coordination of the Engineering Division to develop criteria for criticality radiation alarm and radiation recording instrumentation at the proposed Goodyear Centrifuge Enrichment Plant.

CONTINUING SURVEY AND SURVEILLANCE PROGRAMS

X-RAY GENERATOR AND RADIATION SOURCE EVALUATION

[Keywords: X-Rays; Radiation Protection]

Inspection of one isotopic radiation source showed no evidence of leakage, and the source was properly tagged and stored.

AREA AND EQUIPMENT SURVEYS

Routine and special-request surveys are summarized in Table 1.

Table 1

CONTAMINATION SURVEYS

	September	Year To Date
Work areas	63	362
Lunchrooms	22	67
Pieces of decontaminated equipment	2,861	25,132
Miscellaneous items	2,093	14,131
Shipping cylinders and/or packages	281	2,136
Trailers and railcars handling uranium hexafluoride	84	702
Personnel checks	20	306
Spot air samples	8	141
Shift length air samples	747	7,913

URINALYSIS PROGRAM

Data on urinalysis samples are summarized in Table 2.

Table 2

URINALYSIS SAMPLES

	September	Year To Date
Samples submitted for analysis	638	5,655
Analyses reported	546	5,555
Samples exceeding the plant action guide for uranium and/or alpha activity	3	98

Two of the urine samples containing uranium concentrations above the plant action guide (PAG) limit (0.067 mg/liter for uranium and/or 10 dpm/100 ml for alpha) were from two operators who were in the area when uranium hexafluoride (UF_6) was inadvertly released from a sample connection in the K-633 Test Loop. One was from an operator in Building K-1420 per-

forming routine decontamination work. However, no specific source of exposure could be determined. Follow-up samples in each case showed that the excretion rate had decreased to a level well below the PAG limit, indicating no significant body retention of uranium.

TRAINING AND EDUCATION

New Employee HP Orientation

Sixty-two new employees attended one of three HP orientation sessions presented by members of the HP staff.

Other Training

Thirty-four employees from the Analytical Services Department of the Technical Services Division and 23 maintenance personnel attended one of three 30-min safety meetings presented by members of the HP staff on health physics principles.

A member of the HP staff also presented a 30-min safety meeting on the safe use of a neutron source to 8 employees of the Instrument Maintenance Department of the Fabrication and Maintenance Division.

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